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REPORT OF SANITARY SURVEY, ST. JOSEPH, MO.

By J. H. WHITE, Surgeon, United States Public Health Service.

The city of St. Joseph, with the exception of certain relatively small areas hereinafter discussed, lies on high, rolling ground on the eastern bank of the Missouri River, and is, excepting three small areas, naturally well drained. The soil is porous yellow clay underlaid by limestone. The river flows eastward, then south, and then almost west again and the site of St. Joseph is along the crescent so formed.

The high area, were it not for surface wells and cisterns adjacent to cesspools and privy vaults, as elsewhere noted, could be broadly described as being in all respects fully abreast of the average American city. The low, flat bottom commencing at the foot of Prospect Hill about where Jule Street runs to the river gradually widens to about 300 yards at Atchison Street and to a half mile at Alabama Street in South St. Joseph, and this flat bottom land, naturally unfit for city building, is covered with wretched little "shacks" in much of its northern half and there is always a probability of a general mixing of the contents of cesspools and wells on any occasion of torrential rainfall in this bottom.

Through South St. Joseph runs Brown's Branch, carrying all the rainfall from the high hills around Hyde Park, and at times overflowing the southern section of South St. Joseph, known locally as "Skeeterville," and making it a fact beyond question that the contents of wells and cesspools get thoroughly mixed.

City Water Supply.

In company with Col. Joseph A. Corby, of the board of health, and Mr. Taylor, superintendent of the water company, I visited and inspected in detail the St. Joseph water works, which I will describe in the language of the report of the New York board of underwriters, whose exhaustive and accurate physical description I can not improve upon.

General outline of system.—The supply, taken from the Missouri River, about 3 miles north of the business center of the city, is raised by low-lift pumps to sedimentation basins and a tank, from which it flows to filters, and then to the clear-water basin and high-lift pumps. Distribution is practically in one service with large equalizing reservoir near the pumping station at elevation 308, and a standpipe, ordinarily kept full and reserved for serious fires at elevation 356. A second reservoir, located on a hill in the southern part of the city, with water at elevation 233, is kept full and reserved for fires, and near it a second standpipe, with top at elevation 310, filled at times of high consumption by a booster station, supplies a small area east of the hill.

Supply works—Source.—The Missouri River, with a watershed above the city covering 425,000 square miles, furnishes an inexhaustible supply.

Intake.—Two cast-iron pipes, 36 and 24 inches in diameter, and about 265 feet long, extend into the river and terminate in riveted steel pipes turned down. The pipes are supported by wooden piles and are equipped with gates and screen chambers. The shore above the intake is protected by rip-rap resting on mattresses.

The intake is located on the east bank of the river, opposite a large sand bar, which at low water forms an island. The channel from which the supply is taken has at times been kept open with difficulty. The company maintains a 7,000,000-gallon electrically-operated centrifugal pump for emergency use, which can be mounted on a scow and operated by electric power generated in an independent plant near the boiler house. Two thousand feet of 20-inch flexible steel pipe is on hand.

Sedimentation basins and filters.—Low-lift pumps raise the supply to two sedimentation basins located about 500 feet southwest of the filter house. These were built in 1898 and 1907, cover areas of 0.78 and 0.84 acres, are 12 and 14 feet deep, and have available capacities of 3,000,000 and 4,500,000 gallons, respectively. They have reinforced concrete walls backed by earth embankment and concrete bottoms, are divided into sections by wooden baffles, and are in good condition. From the sedimentation basins a part of the supply flows to eight rapid sand filters, constructed in 1913, each 12 by 17½ feet; combined capacity 4,800,000 gallons a day. The remainder of the supply is raised by low-lift pumps to a sedimentation tank 60 feet west of the filter house and erected in 1897, of riveted steel, 50 feet in diameter, 20 feet high and holding 293,000 gallons; this supplies fourteen 18-foot, wooden tank, Jewell, gravity filters installed in 1897; nominal capacity, 9,000,000 gallons a day.

Filter house.—A 2-story brick building, 170 by 54 feet, connecting with new addition on the south of same width and 64 feet long. Old section divided into about two equal portions by brick division wall to roof; openings in walls between the three sections unprotected. First floor of old section of concrete and wood; second is joisted; in new section, of concrete. Peaked, slate-covered roofs, on wooden sheathing, rafters, and trusses. Electric wiring defective.

Three small 1 and 2 story brick additions on east side of filter house are used for coagulating, lime and alum rooms; division wall openings, between these rooms and filter houses, are unprotected.

Clear-water basins.—Located 40 feet southeast of the filter house and constructed in 1897, of earth embankment paved with brick; bottom of concrete. Consists of one basin 100 by 90 feet on the bottom, 14 feet deep, with available capacity of 1,000,000 gallons.

Connected with the filters and pumping station by a single cast-iron pipe 30 and 36 inches in diameter.

The purification not touched upon in the above quotations, is accomplished as follows:

The raw river water is pumped into No. 1 settling basin, entering this basin over a spillway and the heavy mud precipitated at this point. From No. 1, the water flows by gravity to No. 2 basin. The water is treated with alum solution between No. 1 and No. 2. The amount of alum is of course governed wholly by the turbidity of the water. The maximum amount used during muddy stages is 2¼ grains per gallon, while during the fall and winter months very little alum is necessary to coagulate the water and the average used during these months is approximately $\frac{1}{10}$ grain per gallon of water.

After the water leaves No. 2, the alum basin, it flows through the filters and into a clear-water basin from which it is taken up by high service pumps, into the suction pipes, where the water is treated with a hypochlorite solution, one-eighth pound of the chemical per million gallons of water pumped being used. Lime is seldom used in connection with alum solution as the alkalinity of the raw river water is sufficient to neutralize the alum.

There are 28 filters, the combined capacity of same being 15½ million gallons of water in 24 hours. Of the above filters, 14 are the Jewell type, with a capacity of 9,000,000 gallons per day, and 8 are of cement, recently built and with a capacity of 5,000,000 gallons per day. No. 1 settling basin has an area of 36,575 square feet, with a depth of water of 17 feet. No. 2 settling basin has an area of 31,300 square feet, with a depth of water of 14 feet.

The resultant water supply is fairly clear, though at times retaining some stain but no mud, and though hard on account of lime salts held in solution is a good potable water, in which bacterial incidence seldom exceeds 25.

Surface Drinking Water

An ordinance is in existence which provides ample authority for the board of health to inspect wells, cisterns, and springs, and when they find that such waters are unfit for drinking or cooking purposes, to condemn them and forbid their use, and if the board of health receives the proper backing in the inforcement of this ordinance it will be enforced and will go a long way toward compelling the general use of the city water supply, which is good.

I believe I am justified in saying that it would compel 90 per cent of the independent water users to take city water, and would meet with the approval of the majority of the people, most of whom now use wells and cisterns for drinking purposes, purely because they can not get the city water, being tenants and unable to get their landlords to make connections.

A full test of all surface supply as rapidly as it can be made and the compelling of connections with city water mains should remove practically all criticism of the water supply of St. Joseph, and will also, in my opinion, reduce the typhoid morbidity to European levels, as the probability of milk convection is not great.

Milk.

General ordinance No. 1366, enacted in September, 1911, provides that all persons or firms selling milk shall obtain from the board of health a certificate of registration good for one year, but there is an unfortunate provision that part of this ordinance is not obligatory on persons selling milk from not more than two cows.

There is also provision that the tuberculin test is to be applied to all cows employed in the production of milk.

The ordinance demands full and proper precautions with regard to storing, cooling, and distribution of milk, and further for the labeling of sterilized and pasteurized milk, and enters into minute details as to what shall constitute a proper pasteurization, providing also for the temperature at which the milk is to be kept after such pasteurization.

There is a provision that no milk shall be sold which shall contain more than 300,000 bacteria per cubic centimeter.

It enters into the necessary minutiæ, as to the care, feed, and housing of the cows themselves, and as to milkers and utensils, and is in every respect a thoroughly good ordinance with the exception named, that any one can keep two or less cows without being subject to any of the provisions of the ordinance except that applying to tuberculin test and to delivery at houses where contagious diseases exist, and I deem this unfortunate, though perhaps unavoidable at the present time.

Another possible source of criticism lies in the fact that although the United States Government score card is used for scoring dairies and milk depots the minimum score is not high enough and should be raised to 60 minimum.

The board earnestly endeavored to provide for certified milk, but could not, the demand for such milk at the necessary increase in price being insufficient to justify its production, but even without this, it is only fair to say that the strenuous efforts of the health board have resulted in good milk supply.

Food Inspection.

An ordinance provides for the inspection of food and drink and prohibits the sale of unwholesome products, but the ordinance does not provide for covering to prevent the contamination of articles of food placed on sale, but section 4 of the food and drug act of the State of Missouri (H. B. 275) provides for this matter, and ordinance 1154 of the city gives authority to the clerk of the board of health to enforce all pure food and drug laws of the State, thus covering this hiatus.

The enforcement is fairly good and though some meat, grocery, vegetable, and fruit stands do not obey the law and some only in a perfunctory way, the fact remains that many do obey the law, and I am sure that the board will secure real obedience as soon as they can obtain the essential support of the law officers in punishing infractions of the code, and I believe present efficiency would be served by employing an additional inspector in this department.

Garbage and Waste.

Section 3 of General Ordinance No. 834 provides for the removal by private contract of all waste materials, including garbage and night soil, from all premises in the city, but unfortunately only inferentially orders the separation of these different characters of waste and does not specifically order their separation, which, as later shown, is most desirable.

This ordinance does not accomplish entirely the end for which it was framed, nor does there seem to be any reason to believe that anything short of the vesting of complete authority in the board of health to have this work done at the actual expense of the city can attain this end, and in my opinion a law which would provide for this would subserve both economy and efficiency.

Taking these matters in detail, we find the following conditions, which all show the imperative need of a full and complete separation of the different objectionable materials to be removed:

Ashes are in some instances separated, in others not separated, from other material. If separated they are susceptible of use as filling, and under such conditions offer no sanitary hazard. The same is true if mixed with ordinary trash, but not true when mixed with decomposing animal or vegetable matter, and it is unfortunately true that under existing conditions one may occasionally see dead rats and chickens mixed with trash, rags, garbage, horse manure, and ashes all in one pile. This is not by any means the rule, neither is it an entirely uncommon spectacle.

Stable manure is at present supposed to be carted to the city dump, and should always either be carted there and covered with a deep layer of earth as soon as possible, unless taken out to the farms, where it can be used, or incinerated, which last at present is not practicable.

Night soil, of which vaults and cesspools furnish a very considerable quantity, should be and is chuted through a special construction into a sewer provided therefor at the dump, and thus handled adds neither more nor less of danger to the river than other sewage thrown in from the house drainage system.

Ordinary dry waste, such as tin cans, paper, small boxes, and the endless number of small articles daily thrown away, offer a purely mechanical problem in this latitude, and if not burned can safely be dumped into any place needing filling, and if covered there with earth offer no further problem.

Garbage.—Kansas City, Providence, Denver, Omaha, Colorado Springs, and other cities have their garbage fed to hogs, with the uniform result that the cost of removal is reduced to some extent to the city and that the contractor, according to his business capacity, is able to make more or less profit from the feed so obtained. There is no danger in this system under proper handling. Any supposed danger to the hogs can be prevented by prompt handling of garbage to prevent unnecessary fermentation, and by use of hog cholera serum to prevent disease. The proper cleaning of the pens, if in the city, eliminates any danger to man.

The system in use at Providence for the past 20 years is entirely simple, the hogs simply running at large on a farm outside the city, and doing handsomely without any precaution of any kind, their ordure being broadcasted over several hundred acres.

The board recommends this system, and I heartily concur with them that it offers the best available solution of the garbage problem.

The separation of garbage is, of course, absolutely essential to putting into effect the system proposed.

The dump, although unsightly, need not be and is not insanitary, provided garbage and night soil are cared for as suggested under the heading above, for the reason that the dump will then be reduced simply to dry waste material and stable manure, and if all were covered with a heavy coating of earth or of sand thrown up from the river, the whole transaction being behind cribwork, the net result would be the accumulation at that point of valuable land without any sanitary risk.

Dead animals are disposed of in a thoroughly satisfactory manner by contract with a rendering establishment.

Regulations of Privy Vaults and Cesspools.

City ordinance No. 1426 compels connection with sewers in the limited area between Main, Jule, Twelfth, and Lafayette, known as the sanitary district, and this is very thoroughly done.

Elsewhere it is unlawful to build cesspools and vaults and use the same except by special permit, and under certain conditions as to method of construction, which method, while in the main indicating good water-tight construction, does not guarantee that this water tightness will continue and that soil pollution may not supervene at any time.

From time to time the board of health has discovered *B. coli* in some of the surface wells, and it is easy to see that it could hardly be otherwise in shallow wells and cisterns close to cesspools and privy vaults and separated therefrom only by a few feet of porous yellow clay and a thin and easily cracked wall of brick and cement and in many instances of cement alone applied direct to the sides of the cistern, cesspool, or vault with no pretense of brick wall.

There is a very large percentage of such conditions (juxtaposition of privy and well) all over the city outside the sanitary district of about 88 blocks above remarked upon.

The removal of night soil from privies is done in ordinary dump carts to the sewer chute at the dump, the material being too solid for odorless excavators.

While about 90 per cent or perhaps more of the better class of residences in the city are connected with sewers, there remains in cases of the less well-to-do householders more then 50 per cent unconnected and having to depend upon these cesspools and vaults, and this in view of the fact that wells to supply drinking water are as above stated dotted all over the city, is an insanitary condition urgently calling for correction and fully appreciated by the board of health.

I have suggested to the board of health the use of Uranine A. to test whether or no the privies pollute the wells or cisterns in any locality, as the vivid physical proof given in this test is beyond controversy (the most convincing argument ever put before the laity) and such proof as will assist the board in compelling immediate water and sewer connections in all such cases.

Sewers and Drains.

The city is provided with six main sewers of large dimensions and three of moderate size, all discharging into the Missouri River direct. All of these in turn receive the effluent from many smaller laterals.

The system is practically coextensive with the city limits except in that part of South St. Joseph which is known as Hyde Park and the other portion of South St. Joseph below Alabama Street, derisively known as "Skeeterville," and a small portion northwest of the railway tracks and north of South St. Joseph known as Florence. It is probable that these three sections will be sewered in the near future and there will no longer be any reason for failure on the part of the property owners to make sewer connections.

As indicated by the course of the main sewers, the natural drainage of the city of St. Joseph is, with the exception of the flats along the river in the upper part of the town and the whole flat area between South St. Joseph and the packing houses below the city, as good as one could possibly desire, the high hills rolling into long sloping valleys, making this natural drainage over all parts of the city having an altitude of more than 25 feet above the river exceptionally good, and the city has provided a sewer system which in all of its ramifications covers a distance of over 100 miles, and is under most conditions of sufficient caliber to carry off both storm water and sewage, the system being a general one in which these two factors are not divorced, as they always should be. The necessity of divorcement for sewer and storm drains is most patent in South St. Joseph, in parts of which the ground is so flat that at times when the sewers are surcharged with vast volumes of muddy water coming down from the higher districts on the hills it is impossible for the house drainage to find egress and sewer gas if not worse is forced back, making an exceedingly undesirable situation.

Another matter worthy of consideration, but not in any sense a criticism of the sewers themselves, is that the sewers are used for house connections to such a limited extent as to nullify a large part of their usefulness, and despite the earnest endeavors of the board of health the only section in which there is complete water and sewer connection is the relatively small area bounded on the north by Jule, east by Twelfth, south by Lafayette, and west by the river and Main Street, an area which does not stand for more than one-tenth of the total area of the city, and as a consequence of this lack of connection the whole city, including some of the best residence sections, is dotted over with cesspools and privies, many of which are in very bad condition; and this situation is the more to be deplored when it is remembered that in hundreds of premises surface wells furnish the water supply and the soil is sufficiently porous to permit easy access of foul matter from vaults into wells.

In this connection I can conceive of no one idea which put into execution would do more to correct this difficult and dangerous situation than the extension of the sanitary district before mentioned to cover as much of the central portion of the city as may be possible at this time. This I deem an immediate need second to none save the proper disposal of garbage, with which question this is inextricably interlocked.

Care of Contagion.

The board has an unusually good pesthouse for smallpox, but, as is too frequently true, little or no provision for isolation of suspects at any time, and since the withdrawal by the police of authority to use isolation quarters over the police station, they have no provision whatever for isolation of suspects from smallpox or any other infectious or contagious disease pending definite diagnosis.

The St. Joseph's Hospital in contracting for the care of city patients should provide for suspects and even for the care in toto of everything except smallpox, as is done as a matter of course elsewhere, and to which there can be no reasonable objection if an isolation ward or wards are provided, and it would seem that such an arrangement would not only be satisfactory from a sanitary standpoint, but would be mutually profitable.

The system in use by the board for collecting information of the existence of infectious disease is the post-card notice supplemented by telephone call, first as to occurrence of case, second as to disappearance of symptoms and readiness for disinfection.

The board uses a warning notice to physicians who fail to report, and this notice removes all question of ignorance of the law.

This system is very simple and complete and in connection with a fortnightly bulletin issued to the profession makes up one of the most easily handled and easily searched records I have seen.

Pollution of Public Places.

Spitting in public places and on the sidewalks is forbidden by ordinance and the enforcement of this is excellent.

Despite the fact that alleys are occasionally dirty, the streets of the city are in the main clean and in the sanitary district very clean.

Common Use of Cups, Towels, Etc.

The State law forbidding the use of common drinking cups and towels is by order of the board of health in force here and very effectively executed.

Public Convenience Stations.

Three places are provided for women's emergency use and serve an excellent and very real sanitary purpose. There is no such place for men, who are therefore compelled to resort to barrooms or the like.

The Social Welfare Board.

The social welfare board is a new board created by act of legislature of 1913, was organized in June of the same year, and secured for executive secretary a trained social worker to assume office April 1, 1914.

This board comes in first contact with much of the infectious disease work of the city, as it is the official body which cares for the dependent sick.

It is made the duty of this board to transfer to the board of health all such cases as soon as the diagnosis is established. These boards cooperate fully.

The law says that the welfare board shall have power to protect the general welfare of the poor by sanitary reformations and specifically mentions insanitary housing.

This board, therefore, has the opportunity to do much fundamental work along the lines of preventive medicine, and the indications are that it appreciates this fact and will act upon it.

The fact that this board consists of public-spirited citizens and is headed by Dr. Daniel Morton, who has at all times manifested a profound interest in public welfare, giving freely with his fellows of his time and work without any remuneration whatever, is a guaranty that the work of this board will be very effective

Summary and Recommendations.

The city board of health as now organized consists of three members, one of whom is president and executive officer, and all of whom take an active personal interest in the administrative functions of the board. No one of these gentlemen receives a dollar of compensation and therefore the city stands in the light of receiving charity from its own public-spirited citizens, or else getting a pretense instead of real service. It happens that this board renders real and most efficient service and therefore that this very wealthy city stands in the unenviable light of not paying some of its most efficient officers for faithful effort to keep the city in sanitary condition with an entirely too small allotment of funds.

That good work can continue under such a system is beyond belief, and there is only one possible way to provide the city with a surely and continuously good health system, viz:

The provision of a budget of not less than 50 cents per capita of population for the board of health and the employment of a commissioner of public health with compensation sufficient to justify the giving of his whole time to the services of the city.

The commissioner of health should give his whole time to the work in order that no detail of any matters named in this report and recommendation may escape his notice and that the smallest as well as the greatest of the city's sanitary interests shall have prompt and effective attention.

Such attention will take every moment of his time and not permit to him any practice of medicine or surgery, either public or private.

The board of health under these conditions can then give the city the benefit as now of their mature judgment, but would have no administrative work thrust on them as now happens.

It is perhaps superfluous to state that full time salaries are paid by many cities smaller than St. Joseph and less wealthy, but this is done by Savannah, Ga., which with less than 75,000 people pays its health officer $3,600 per annum, and an even smaller community, North Yakima, Wash., which pays its health officer $4,000.

Such an appropriation as I have suggested would provide for the additional inspectors needed, as well as for the pay of the commissioner of health.

Finally, I can not too strongly emphasize the necessity for support of the most real and active sort by the law officers to the health officers.

The administration of public health may have been of slight importance in villages in years gone by, but in the modern city of to-day lapses caused by ignorance, indifference, or inability to enforce a law, may have calamitous results. Unchecked use of polluted milk or water might easily cost St. Joseph a thousand lives and two thousand times that many dollars.

This is the responsibility which the people of any city must face and is a distinct possibility always in the absence of a strong health organization.

Water.—The supply furnished by the water works company is good potable water and is used by approximately 75 per cent of the people. The remainder use water from wells and cisterns, many of which are of exceedingly doubtful character. The proper and only solution of this question is prompt and vigorous action by the law officers of the city to enforce the ordinance closing polluted wells and cisterns.

Milk.—The milk supply of the city on the whole is good, and great care is exercised by the board to maintain the quality. No comment is required here beyond the suggestion that the score-card minimum be raised to 60 in a possible 100.

Food products are inspected under State law and the condition, while not ideal, is as good as could be obtained without a greater inspection force. Betterment can be obtained by employment of an additional food inspector and vigorous enforcement of the State laws.

Sewers are as good as the conjoint system of sewer and storm drain can ordinarily be and are fairly sufficient in extent and are being extended all the time.

Privies and cesspools are far too numerous and constitute, like garbage, one of the most serious problems confronting the board.

No effort should be spared toward enforcing sewer connection and it is the manifest plain duty of the city common council to extend the sanitary district and to do so at once.

Garbage and waste present one of the most serious problems which the board has to face, and conditions here, through no fault of the board, are undeniably bad and need correction.

The remedy is separation into—

Ashes, to be used as filling or dumped.
Trash, to be used as filling or dumped.
Manure, to be carted to farms or dumped.
Garbage, to be fed to hogs, collection being made by the city through its own agencies.

Table of percentages of conditions in the less sanitary districts.

Locality.	Using city water.	Using wells.	Using cisterns.	Having sewer connections.	Disposal of—	
					Garbage and manure.	Trash.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
St. Joseph proper	90	3	7	40	70	75
South St. Joseph	55	35	1	1	47	57
Skeeterville, Florence, and Hyde Park	48	27	1	....	48	52

Night soil is very well disposed of if it must exist, but should be eliminated entirely by a complete connection of premises and sewers.

ROCKY MOUNTAIN SPOTTED FEVER.

SOME INVESTIGATIONS MADE DURING 1912 BY PASSED ASST. SURG. T. B. McCLINTIC.

Prepared for publication by L. D. Fricks, Surgeon, United States Public Health Service.

During the summer of 1912, from April 11 to July 30, Passed Asst. Surg. T. B. McClintic carried on his second series of investigations of Rocky Mountain spotted fever in the Bitter Root Valley at Victor, Mont.

Early in August, just at the close of a successful season's work, Dr. McClintic himself contracted the disease in the Bitter Root Valley and died August 13 at Washington, D. C. He was thus denied the satisfaction of reporting the valuable observations made by him during his last season's work, which included (*a*) the first systematic determination of the percentage of infective ticks from different localities in the Bitter Root Valley, (*b*) the discovery of immune and, therefore, presumably previously infected ground squirrels (*Citellus columbianus*) in nature, (*c*) studies on the susceptibility of the woodchuck (*Marmota flaviventer*), the rock squirrel (*Callo-spermophilus lateralis cinerascens*), and the mountain goat (*Oreamnos montanus*) to Rocky Mountain spotted fever, and (*d*) studies on the efficiency of different dipping solutions used for the destruction of adult ticks on live stock.

Because of the importance of these observations in the further study of Rocky Mountain spotted fever it has been deemed advisable